



Background & AQMD Perspective

Presented to

Biodiesel Forum & Technical Roundtable

***November 7, 2006
Diamond Bar, CA***

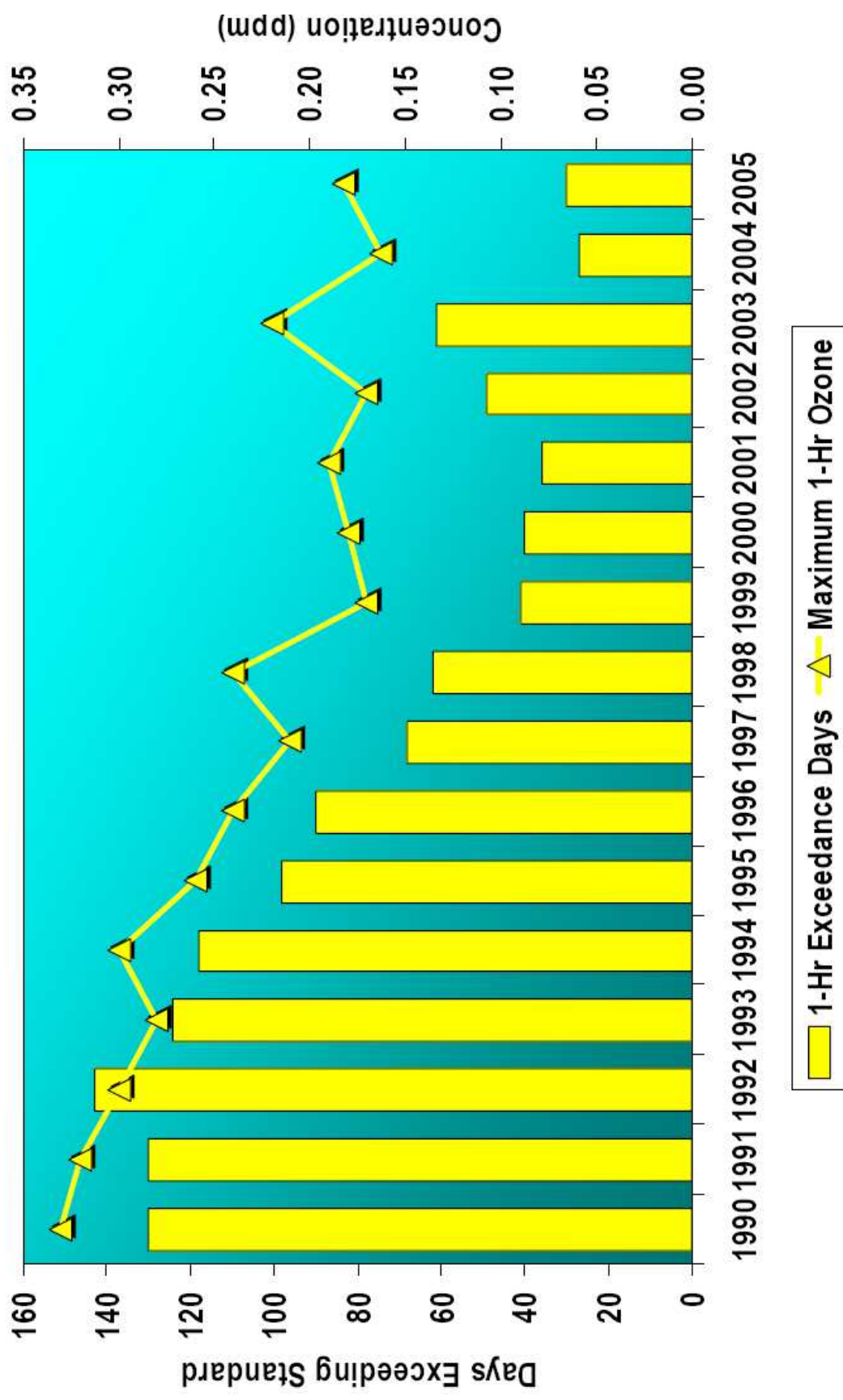
Paul Wuebben
Clean Fuels Officer
South Coast Air Quality Management District



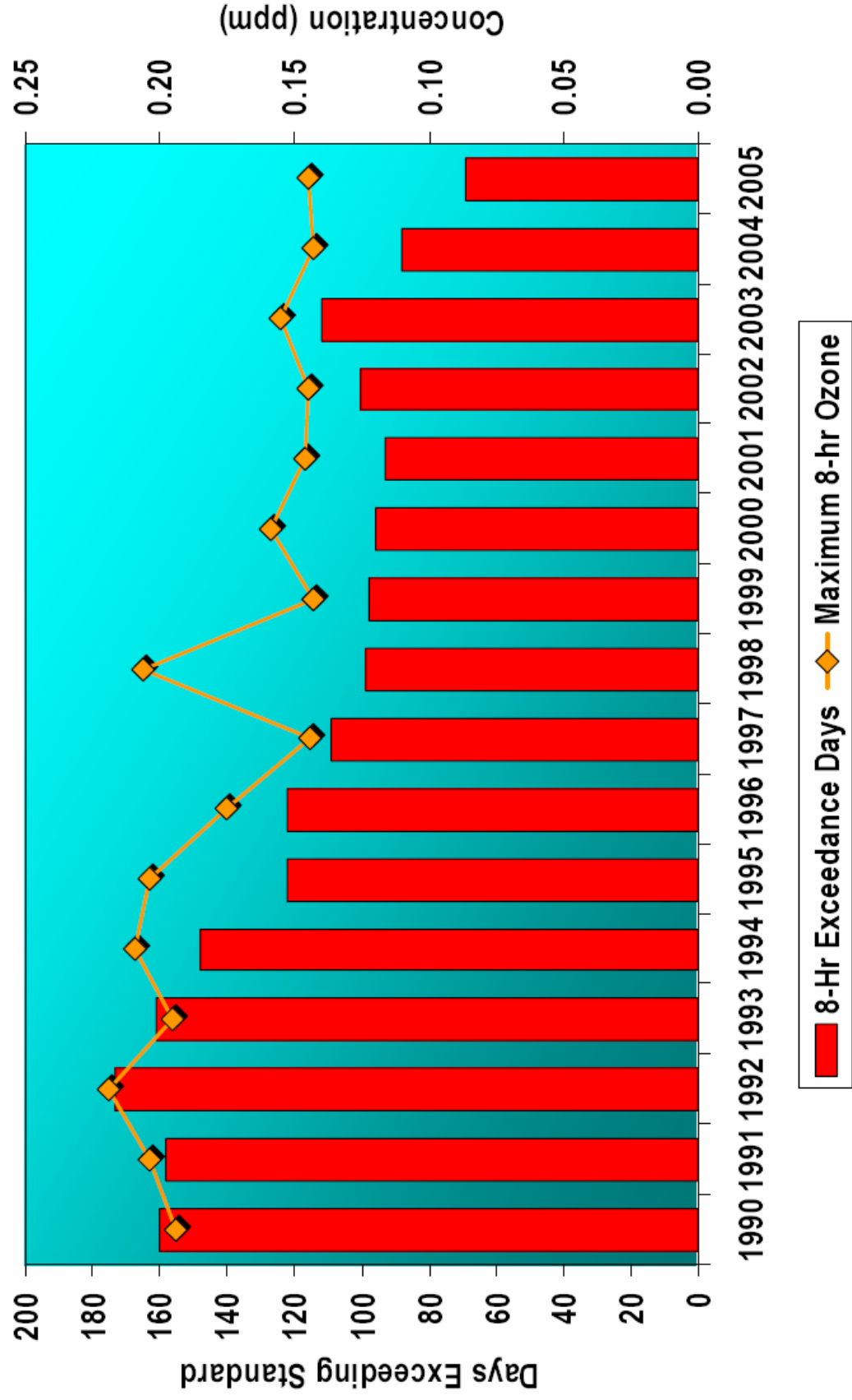
Outline

- Air Quality context
- Biodiesel emission benefits and issues
- Development status and opportunities
- Research and development needs
- Key Questions for this forum

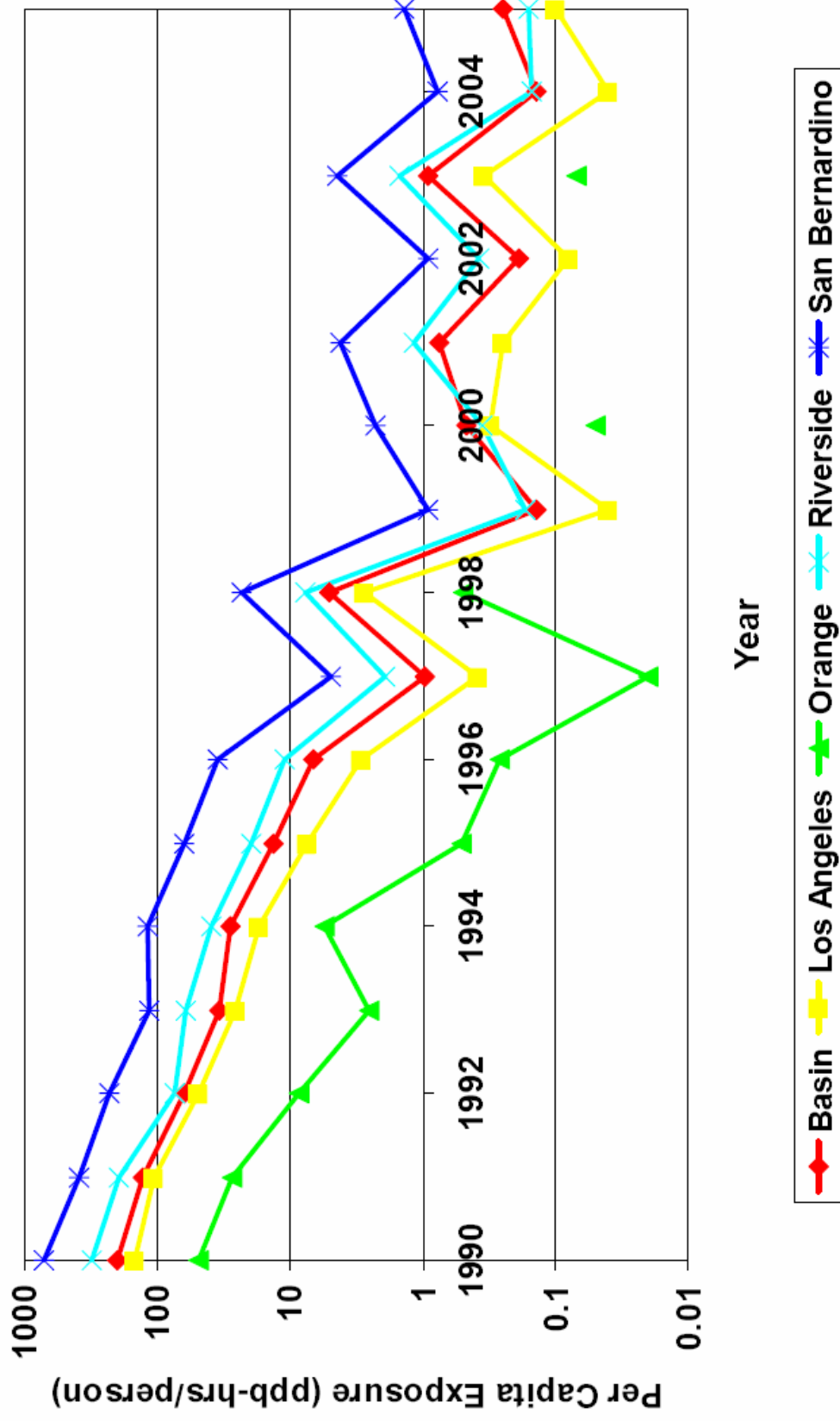
1-Hr Ozone Air Quality Trends



8-hr Ozone Air Quality Trends

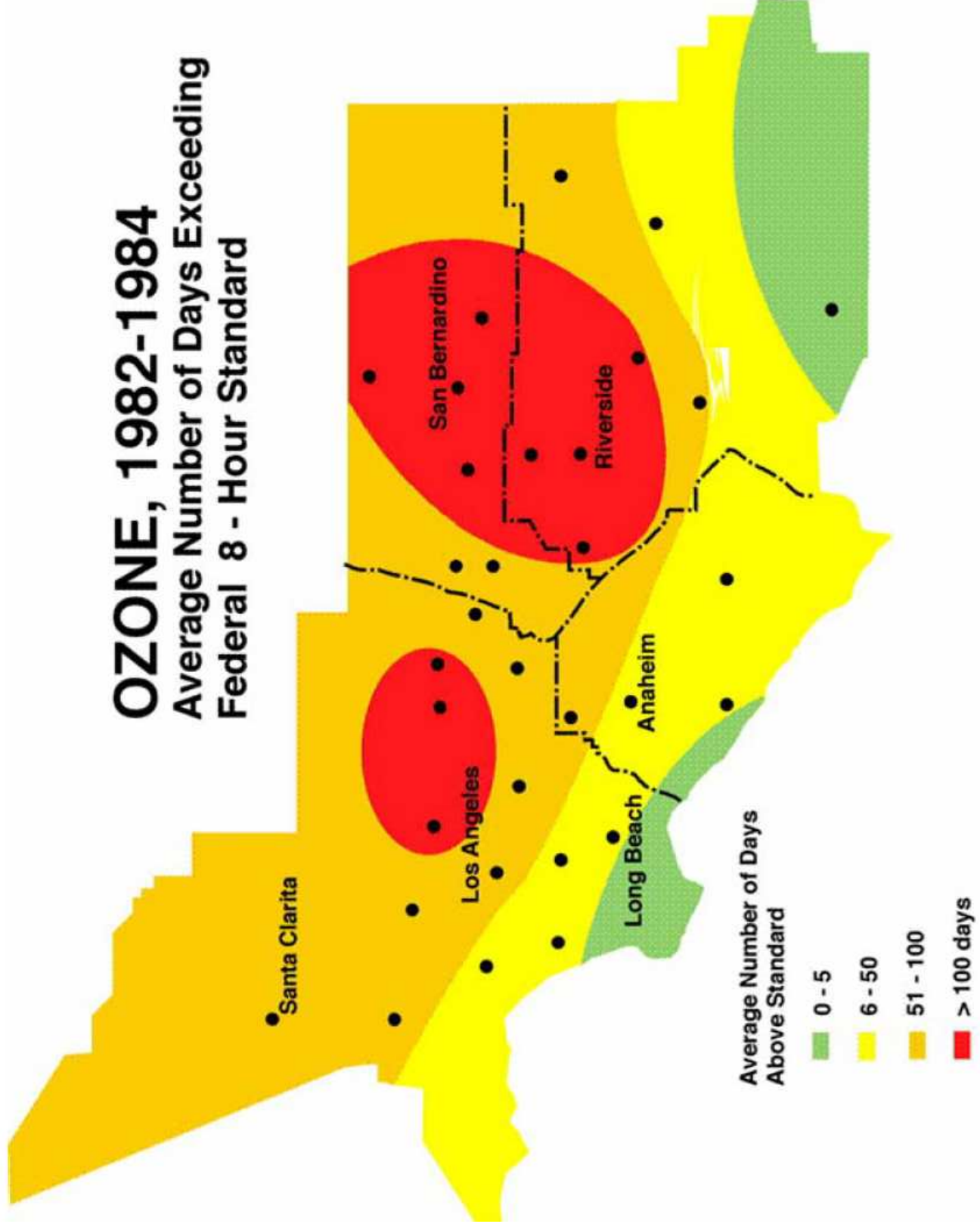


Per Capita Ozone Exposure Above the Federal 1-Hour Standard



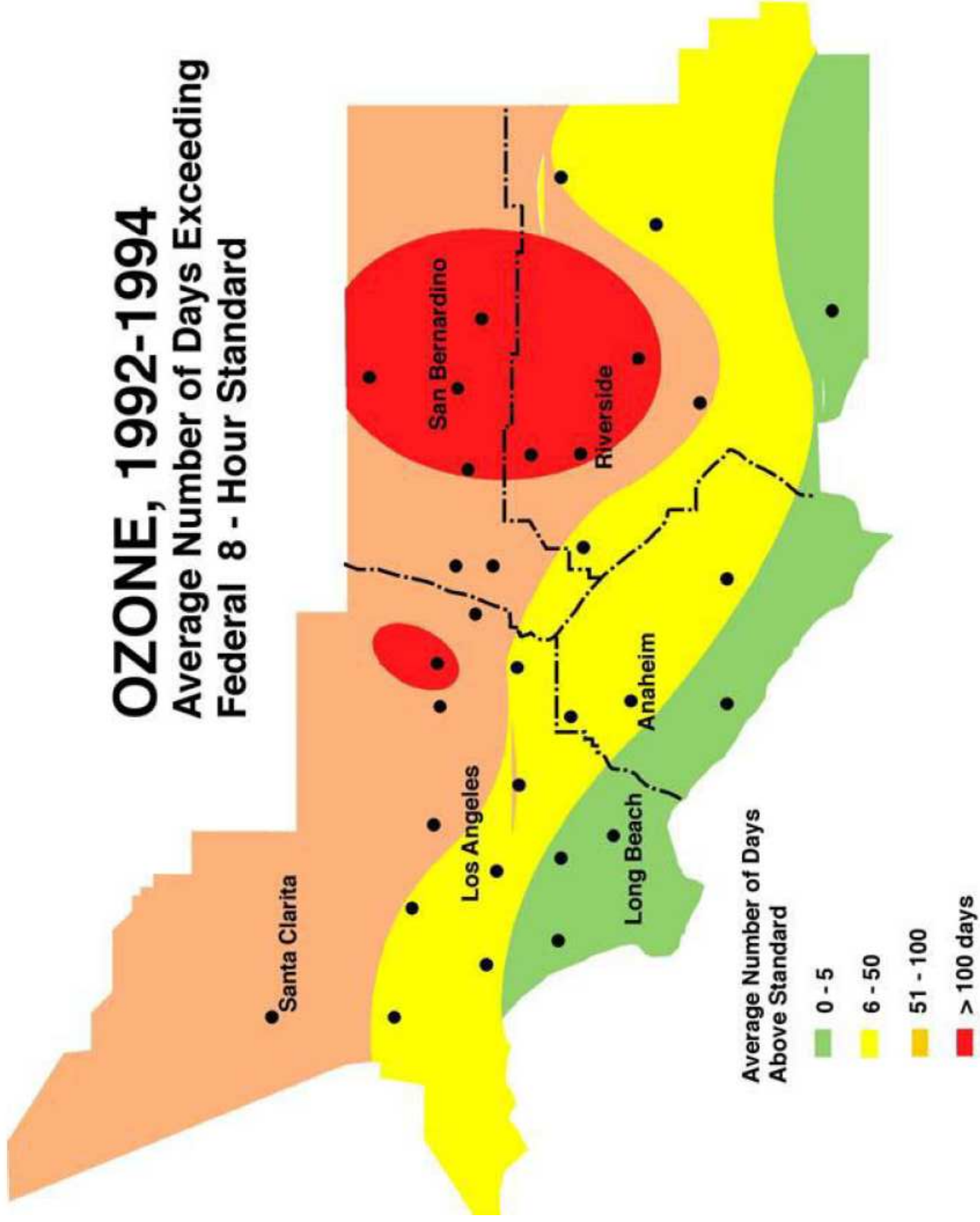
OZONE, 1982-1984

Average Number of Days Exceeding Federal 8 - Hour Standard



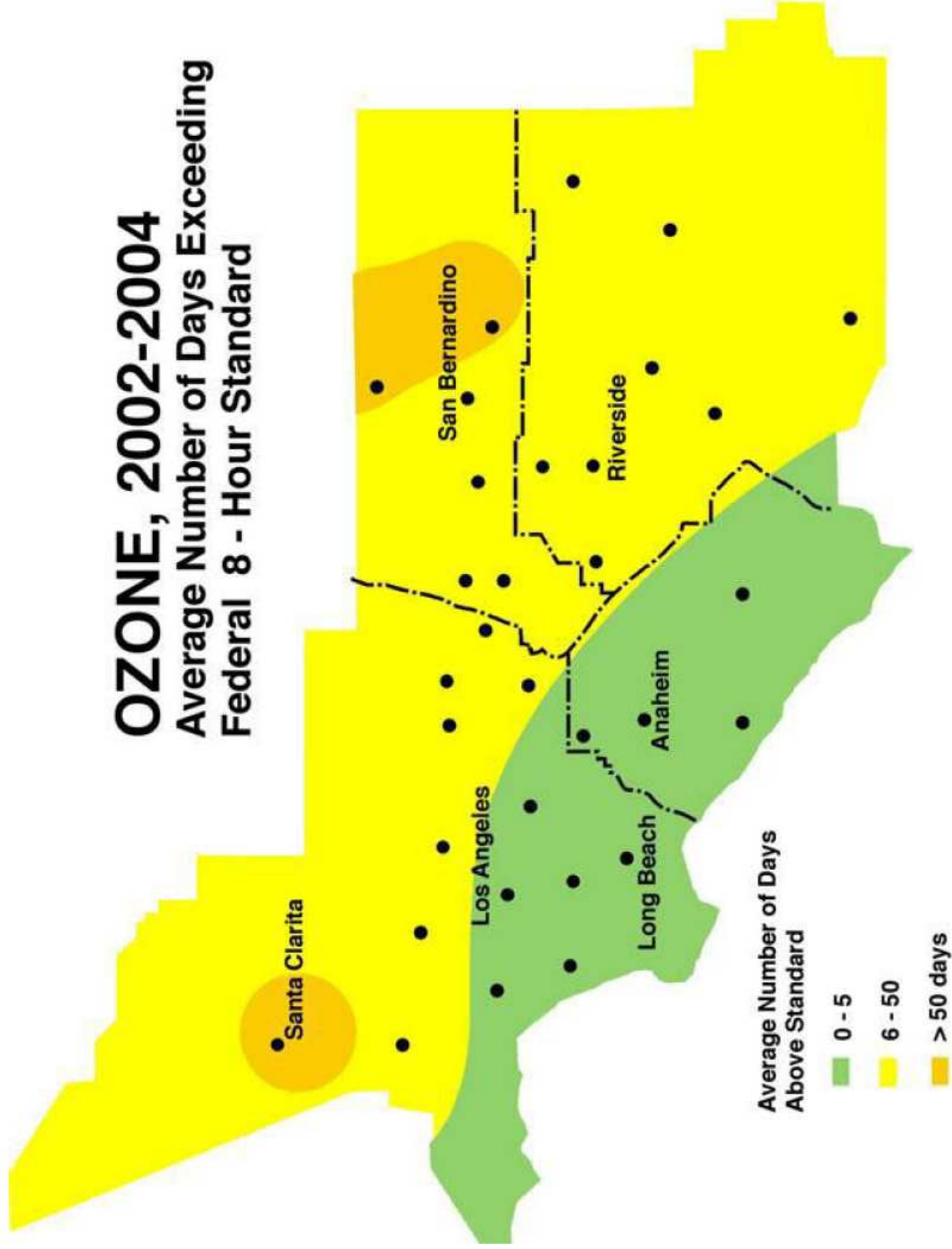
OZONE, 1992-1994

Average Number of Days Exceeding Federal 8 - Hour Standard



OZONE, 2002-2004

Average Number of Days Exceeding Federal 8 - Hour Standard





Strategic Drivers

- Air Quality
- Energy Resource Depletion
(peak production etc.)
- Security / Stability of Imports
- Severe Climate Change

AQMD Perspective on Biodiesel



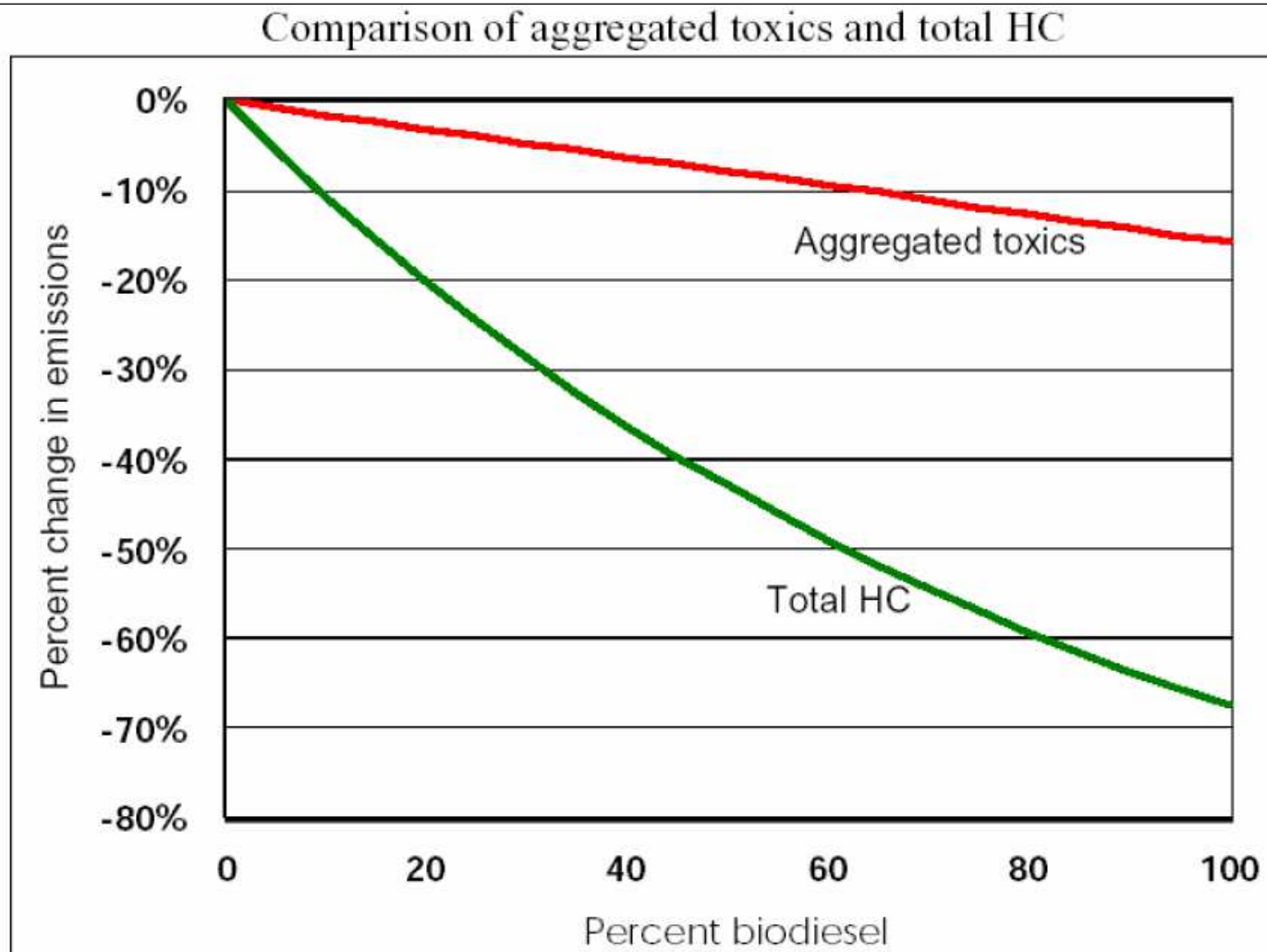


Biodiesel Commercialization Trends:

- Total of 19 million B100 gallons in 2004
- 50 million gallons estimated in 2005
- CA usage of B100 \approx 2 MM gallons for 2005
- Strongest users: US military fleets
- Neste Oil (Finland)
 - 2nd generation: 84 – 99 cetane
- World Energy current largest US producer
- Most effective incentives:
 - blender incentives & excise tax relief

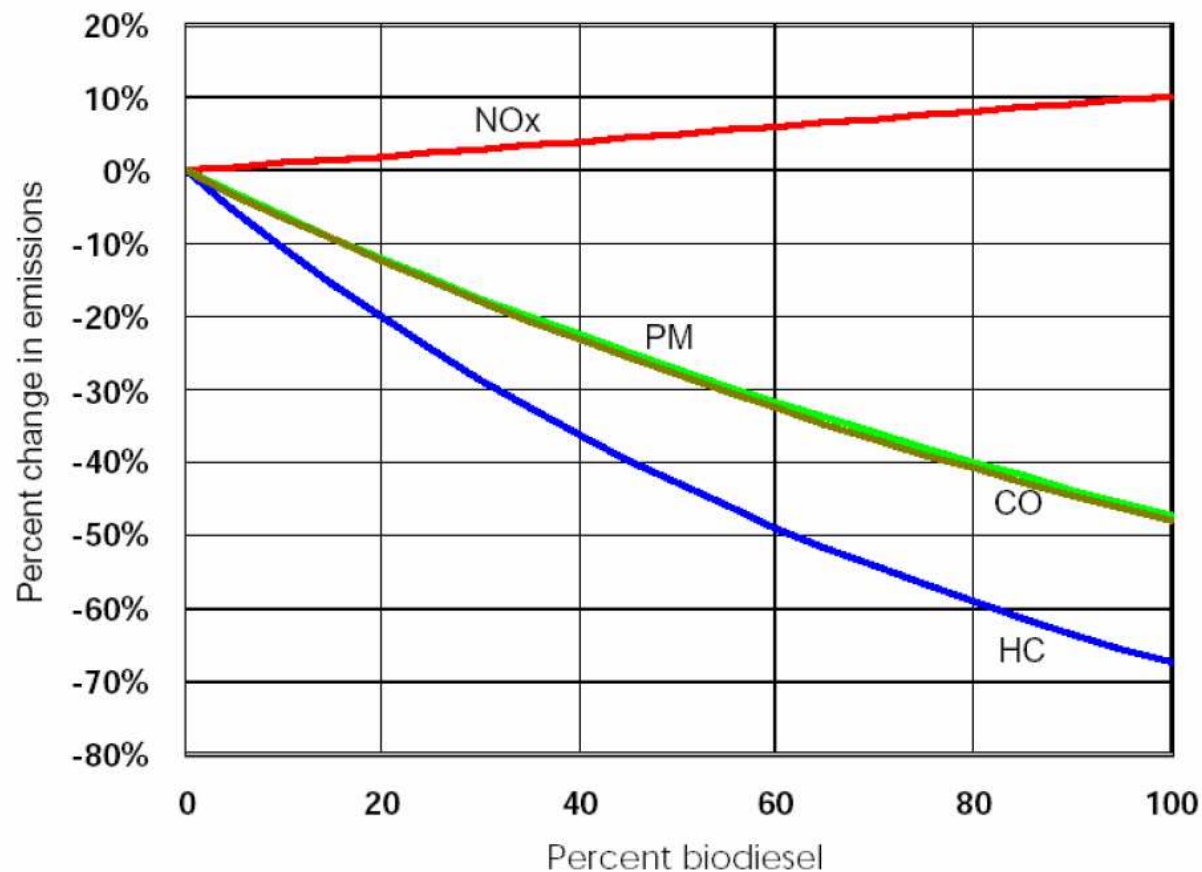
Reduction in HC + Toxic Emissions

Based on EPA 2002 Test Data



EPA Engine Test Results - 2002

	<u>PM</u>	<u>NO_x</u>
B-5	- 5%	uncertain
B-20	- 12%	+ 2% + / -
B-100	- 48%	+ 10% + / -





Market Development Issues:

- **Feedstock reliability**
- **Consistency of Product Formulation**
- **Blend level policy**
 - **< 2% ? ≤ 5% ? ≤ 20% ? Other % ?**
- **Oxidative Stability / Gumming potential**
- **Engine Durability**
- **Effects on Warranties (*OEM + retrofit*)**
- **NOx emissions, including off-cycle effects**
- **“Unintended consequences”:**
 - **Need for detailed Multimedia Review ?**
- **Effect on Fuel Economy**



SCAQMD Biodiesel Policies

- **Need to specify composition / source**
- **Initial focus: agricultural uses**
- **Focus on blends $\leq 20\%$**
 - *start with lowest blends of 2 to 3%, etc.*
- **Need for no net increase in NO_x**
 - *NO_x reductions achieved concurrently*
- **Need to better test data**
 - *Diversity of engines, test cycles, durability etc.*
- **Potential role in Air Quality Management Plan with sufficient NO_x mitigation**



Research & Development Needs

- **In use emissions testing of diverse engines, applications and blend rates**
- **Assessment of supply potential to offset growing conventional diesel fuel demand**
- **Fuel quality assurance reporting / monitoring**
- **Assessment of alternative formulations to optimize emissions, performance & durability**



Biofuel Pathways are Diverse:

- ***Sugar Based Bio-refinery:*** Hydrolysis of fibrous biomass to form soluble sugars, using enzymes or acid catalysts, followed by microbial conversion of sugars to ethanol and other products.
- ***Syngas Based Bio-refinery:*** Thermo-chemical production of biofuels using gasification to form synthesis gas, with subsequent production of methanol, ethanol and/or FT-diesel.
[key challenge: reduce excess carbon in syngas through hydrogenation]
- ***Renewable Diesel from Fats and Oils:*** The use of natural oils through biological and thermo-chemical routes.



9 Key Questions for the Forum

- 1) What are the air quality benefits and issues associated with biodiesel?**
- 2) What impact does biodiesel use have on engine performance and emissions warranties?**
- 3) What level of biodiesel should be targeted for blending with conventional diesel?**



9 Key Questions for the Forum *(cont.)*

- 4) What steps should be taken to enhance the specifications for biodiesel?**
- 5) What are the key factors affecting supply and costs?**
- 6) What vehicle and supply test data and evaluations are needed going forward?**



9 Key Questions for the Forum (*cont.*)

- 7) What policies should the AQMD pursue with regard to future use of biodiesel?**
- 8) What is the potential of biodiesel to replace diesel in the U.S.**
- 9) What should be the technical R & D focus for the air agencies like AQMD on biodiesel**

*Thank you for
this opportunity*

